

Curriculum Vitae

Yulun Wu

University of Ottawa

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Education

- 2020-2024 PhD in Geography GPA: 10/10**
University of Ottawa, Ottawa, ON, Canada / Agriculture and Agri-Food Canada
Thesis: *Modelling and Correcting for the Adjacency Effect in Remote Sensing of Coastal and Inland Waters*
Supervisor: Dr. Anders Jensen Knudby
Committee members: Dr. David Lapen, Dr. Chuiqing Zeng, Dr. Michael Sawada
- 2021-2021 Exchange Student, Department of Physics 4/4**
University of Toronto, Toronto, ON, Canada
Obtained A+ in *PHY2505 Atmospheric Radiative Transfer and Remote Sounding*
Term project: *Atmospheric Impacts of Wildfires and Aerosol Plumes: Two Case Studies Using TROPOMI UVAI*
- 2014-2019 Honours Bachelor of Science in Environmental Science (Co-op) 8.7/10**
University of Ottawa, Ottawa, ON, Canada
Honours Thesis: *The spatial distribution of arsenic and other trace metal contaminants and their acute toxicity to Daphnia pulex in lakes near the Giant Mine in Yellowknife, Canada*
Supervisor: Dr. Jules M. Blais

Research/Work Experience

January 2020 - Present

PhD Student, University of Ottawa / Agriculture and Agri-Food Canada, Ottawa, Canada

- Explore the challenges in aquatic remote sensing over small waterbodies such as rivers and small lakes. This includes studying the adjacency effect from nearby land and atmospheric scattering as well as sun-glint induced by wind and turbulence.
- Monitor agriculture-related water quality changes in rivers of Eastern Ontario using high-resolution satellite imagery including Sentinel-2 MSI, Worldview and PlanetScope.
- Calibrate a dual-channel Jaz UV/visible spectrometer in measuring water's remote sensing reflectance following a skylight-blocked approach; collect water reflectance and constituent data using spectrometers and a YSI EXO3 sonde.
- Assess the accuracy of satellite-derived water reflectance from atmospheric-correction tools such as l2gen, POLYMER and ACOLITE; model the radiative transfer in Earth's ocean and atmosphere systems using HydroLight, libRadTran and 6S.

- Participated in international collaborations such as the Remote Sensing Adjacency Correction initiative led by Ghent University and the Atmospheric Correction Intercomparison Exercise led by ESA and NASA.

July 2024 - Present

Remote Sensing and Field Technician, WSP Canada Inc., Montreal, Canada

- Collect field water biochemical properties and reflectance data in St. Lawrence River as part of the smartHarbour initiative to monitor environmental impacts from the construction of a new port.
- Perform atmospheric correction and provide surface-level reflectance from Landsat 8/9, Sentinel-2, and Pleiades imagery to the entire analysis team of six people.
- Analyze water-quality changes in St. Lawrence River using abovementioned satellite imagery.

September 2021 - Present

Lab Coordinator, Shallow Water Earth Observation Lab, University of Ottawa

- Facilitate and organize weekly lab meetings and presentations.
- Coordinate and schedule guest speakers.
- Curate and distribute journal articles and research topics for discussion.
- Promote research through posters and interviews.

April 2022 - June 2023

Assistant Ecologist, Parks Canada, Canada

- Mapped and classified coastal salt marshes and eelgrass beds across national parks and reserves in Canada using aerial and high-resolution satellite imagery.
- Calculated carbon storage and carbon accumulation rate using loss-on-ignition techniques and Pb-210 dating.
- Conducted a one-week field survey of salt marshes and eelgrass beds and mapped their distribution and types on Sidney Island, BC, in June 2022.

January 2022 - March 2022

Contract Worker, Liquid Geomatics, Ottawa, Canada

- Support a project under Canadian Space Agency's FAST program, *Earth observation for detecting and monitoring long-term water quality changes across the Canadian Arctic*, managed by Dr. Knudby.
- Develop a Python-based Monte Carlo code that models the radiative transfer in an atmosphere-ocean-land system and corrects for the adjacency effect for coastal remote sensing; implement surface reflectance models such as water's specular reflection following Cox-and-Munk slope statistics.

February 2020 - 2022

Research Assistant, Network on Coastal, Oceans and Lake Optics Remote Sensing (NetCOLOR), Canada

- Assist in drafting the NetCOLOR Community-of-Practice Report 2 which addresses the reliability and accuracy of aquatic optical satellite products over Canadian waters.
- Match Canada-wide in-situ water-quality data with moderate-resolution ocean-colour products from MODIS, VIIRS and OLCI; plot graphs and maps and calculate statistical correlations in R and ArcGIS.

November 2021 - November 2021

Field Technician, Fluvial Systems Research Inc., Vancouver, Canada

- Mapped water depth in the Rupert River and the Pontax River in Waskaganish, Quebec using a single-beam echo sounder to support the ecosystem modelling of Walleye-fish habitats.
- Collected photogrammetry data for modelling fluvial sediment-size distribution.

May 2018 - August 2020 (Two full-time Co-op terms and part-time during school years)

Spatial Analyst, Ottawa Neighbourhood Study, University of Ottawa

- Manipulated and converted demographic and geospatial data to neighbourhood level using Python, R, ArcGIS and Excel; published data through ONS website.
- Provided ONS partners with standardized data and customized infographics using R, Python and Tableau; derived evidence-based guidance regarding the distribution of funding from data and infographics (United Way East Ontario uses ONS data to allocate \$7.6 M funding to Ottawa communities annually).
- Developed customized Python toolboxes to process spatial data: density/distribution of facilities and events, travel costs (Network Analysis), neighbourhood greenness, food environment, census demographic data and socioeconomic indicators.
- Attended meetings and collaborated with ONS partners such as City of Ottawa, Statistics Canada, Ottawa Public Health, Ottawa Food Bank and United Way East Ontario
- Analyzed the distribution and demographic status of food bank clients in collaboration with Ottawa Food Bank: automated the geocoding of over 30,000 addresses using Python and Google Maps API, processed the information of over one million entries of Food Bank clients using ArcGIS and R, presented the results interactively in Tableau.

January 2018 - April 2018 (Co-op)

Assistant Librarian, Ottawa Hospital Research Institute, Ottawa, Canada

- Collaborated with medical researchers in authorizing methodology sections of systematic reviews about public health.
- Refined the use of query languages and Boolean operators in searching articles.
- Presented findings of retracted articles to researchers and stakeholders.

May 2017 - August 2017 (Co-op)

Research Assistant, Kerr Lab, Department of Biology, University of Ottawa

- Evaluated the impact of climate change on Monarch butterflies' geographical limits using species suitability maps and MODIS satellite images.
- Built a multi-source geographical and physiological trait database of 1,500 North American butterfly species using Excel and R.
- Investigated the effectiveness of Species at Risk Act by detecting the habitat landcover changes using multi-year MODIS satellite images.
- Provided literature and GIS support for graduate-student projects and drafted summaries.

Teaching Experience

September 2021 - December 2022

Teaching Assistant, University of Ottawa, Canada

- Gave lab demonstrations and evaluated student assignments and lab reports for courses including MAT1371 *Descriptive Statistics*, GEG3305 *Geographies of Globalization*, GEG4702 *Le développement des villes*, ENV1101 *Global Environmental Challenges*, GEG3114 *Biogeography*, and BIO2129 *Ecology* (in chronological order).

Refereed Publication

Richardson, G., Foreman, N., Knudby, A., **Wu, Y.**, & Lin, Y. (2024). Global deep learning model for delineation of optically shallow and optically deep water in Sentinel-2 imagery. *Remote Sensing of Environment*, 311, 114302. <https://doi.org/10.1016/j.rse.2024.114302>

Wu, Y., & Knudby, A. (2023, July). *A Tool That Calculates the Sea-Surface Reflectance Factor in Customized Environments and Geometry*. The International Geoscience and Remote Sensing Symposium 2023. https://2023.ieeeigarss.org/view_paper.php?PaperNum=3004

Wu, Y., Knudby, A., & Lapen, D. (2023). Topography-Adjusted Monte Carlo Simulation of the Adjacency Effect in Remote Sensing of Coastal and Inland Waters. *Journal of Quantitative Spectroscopy and Radiative Transfer*, 108589. <https://doi.org/10.1016/j.jqsrt.2023.108589>

Non-Refereed Publications

Wu, Y. (2022). *T-Mart Radiative Transfer Code and Documentation*. <https://tmart-rtm.github.io>

Wu, Y. (2021). *Topography-Adjusted Monte Carlo Simulation of the Adjacency Effect in Remote Sensing of Coastal and Inland Waters* [Report in fulfillment of the requirement for fast-tracking into a PhD program]. University of Ottawa.

Wu, Y. (2020, September). Social Distancing: Easy in a Kayak Surrounded by Instruments – Collection of Remote Sensing Reflectance in Rivers. *Geography, Environment and Geomatics Newsletter*. <https://arts.uottawa.ca/geography/geg-env-newsletter>

Wu, Y., Cheney, C., & Blais, J. M. (2019). *The spatial distribution of arsenic and other trace metal contaminants and their acute toxicity to Daphnia pulex in lakes near the Giant Mine in Yellowknife NWT* [Honours Thesis]. University of Ottawa.

Seminar and Conference Presentations

Wu, Y., & Knudby, A. (2024, June 13). *Adjacency Effect Modelling and Correction for Optical Remote Sensing of Inland and Coastal Waters*. 45th Canadian Symposium on Remote Sensing, Halifax, Nova Scotia, Canada.

Wu, Y., Knudby, A., Pahlevan, N., Lapen, D., Zeng, C., & Begeman, C. (2023, November 15). *Adjacency-effect correction in remote sensing of coastal and inland waters for Sentinel-2 MSI and Landsat-8 OLI imagery*. International Ocean Colour Science Meeting 2023, St. Petersburg, Florida, the USA.

Wu, Y., & Knudby, A. (2023, July 17). *A Tool That Calculates the Sea-Surface Reflectance Factor in Customized Environments and Geometry*. The International Geoscience and Remote Sensing Symposium 2023, Pasadena, California, the USA.

Wu, Y., Knudby, A., & Lapen, D. (2023, May 29). *Adjacency Effect Modelling and Correction for Remote Sensing of Inland and Coastal Waters*. The Canadian Meteorological and Oceanographic Society 57th Congress, St. John's, NL, Canada.

Wu, Y., & Knudby, A. (2022, February 28). *Topography-Adjusted Monte Carlo Simulation of the Adjacency Effect in Remote Sensing of Coastal and Inland Waters*. Ocean Sciences Meeting 2022, Online. <https://osm2022.secure-platform.com/a/gallery/rounds/3/details/5093>

Wu, Y. (2021, May 7). *Topography-Adjusted Monte Carlo Simulation of the Adjacency Effect in Remote Sensing of Coastal and Inland Waters*. Geography, Environment and Geomatics Graduate Student Conference, University of Ottawa.

Wu, Y. (2021, March 17). *Topography-Adjusted Monte Carlo Simulation of the Adjacency Effect in Remote Sensing of Coastal and Inland Waters*. The 3rd National NetCOLOR Meeting, Université Laval.

Wu, Y. (2020, September 2). *Retrieval of remote sensing reflectance in the South Nation River, Ottawa*. NetCOLOR Communities-of-Practice Workshop, University of Ottawa.

Wu, Y. (2020, February 24). *Satellite derived water quality observations in inland waters*. Canadian Hydrographic Conference, Quebec City, Canada.

Wu, Y. (2020, February 11). *Remote sensing-based detection of point source pollution in Canadian waterways*. NetCOLOR Communities-of-Practice Workshop, University of Ottawa.

Wu, Y. (2019, November 6). *The use of satellite imagery to monitor inland water quality*. EVS4904 Environmental Science Seminar, University of Ottawa.

Wu, Y. (2019, October 9). *Remote sensing of seaweed in the Atlantic Ocean*. EVS4904 Environmental Science Seminar, University of Ottawa.

Wu, Y. (2019, April 8). *Lakes close to an abandoned gold mine continue to show hazardous metal(loid) concentrations for Daphnia pulex (water fleas) despite a decade of recovery* [Honours Thesis]. Poster Presentation, University of Ottawa.

Lectures and Workshops

Wu, Y. (2024, March 5). *Introduction to Ocean Colour Remote Sensing*. GEG4104 Methodological and Theoretical Approaches in Geography and Environmental Studies, University of Ottawa.

Wu, Y. (2024, January 26). *Workshop: Building Your First Radiative Transfer Model through Monte Carlo*. Shallow Water Earth Observation Lab, University of Ottawa.

Wu, Y. (2016, February 8). *An overview of industrialization and its environmental impacts in developing countries*. ENV1101 Global Environmental Challenges, University of Ottawa.

Research Grant

2023-2024 Big Idea Grant, University of Ottawa (\$20,000)

Scholarships and Awards

2024	Association of Professors of the University of Ottawa Award (\$1,500)
2022-2023	Ontario Graduate Scholarship for International Students (\$15,000)
2021-2025	PhD Admission Scholarship, University of Ottawa (\$78,500)
2021-2022	Student Experience Fund, University of Ottawa (\$1,000)
2021	BMO Financial Group Graduate Bursaries (\$4,000)
2020-2021	uOttawa International Graduate Bursary, University of Ottawa (\$4,000)
2020-2021	Suzanne Gratton-Sarrazin Scholarship, University of Ottawa (\$2,050)
2019	Roger Guindon Scholarship Fund (\$1,000)
2019	Gilles G. Patry Community Engagement Scholarship (\$1,000)
2018	J. P. Bickell Foundation Mining Scholarship (\$2,000)
2017-2023	uOttawa Financial Aid Bursary for International Students (\$3,250)
2017-2019	Faculty of Science Dean's Honour List & Merit Scholarship, University of Ottawa (\$3,000)

- 2017-2019** Science Students' Association International Student Scholarship, University of Ottawa (\$1,000)
- 2017** Brian Rust Memorial Scholarship (\$1,600)

Training

- 2022 International-Ocean-Colour-Coordinating-Group Summer Lecture Series (July 18-29, 2022). Institut de la Mer, de Villefranche, France.
- Monitoring Coastal and Estuarine Water Quality Using Remote Sensing and In Situ Data (November 30 - December 7, 2021). NASA ARSET, online training.
- International Fall School in Hydrographic Surveying (October 25-29, 2021). Laval University, Quebec City, Canada.
- Monitoring Coastal and Estuarine Water Quality: Transitioning from MODIS to VIIRS (September 14-21, 2021). NASA ARSET, online training.
- Google Earth Engine Mini-Course (May 25-29, 2020). Carleton University, Ottawa, Canada.

Volunteer Experience

- 2023** Provided mentorship to an early career researcher in developing and delivering a virtual presentation for the Geo AquaWatch Water Talks series.
- 2020-2023** Oversee the annual budget of the Geography Graduate Student Association as the treasurer of the association
- 2017** Managed and updated *the Tree Map* at Ecology Ottawa, Ottawa
- 2017** Organized events and coordinated volunteers at uOttawa Table Tennis Club
- 2016** Assisted in administering and recycling of student donations at uOttawa Sustainability Office

Other Information

- Advanced operations certificate – small remotely piloted aircraft systems (PRAS)
- Wilderness First Aid with CPR training
- Canada pleasure craft operator card
- WHIMS, radiation safety certifications
- Ontario G driver's licence
- Over 150 hours of community services and volunteering since 2015

References

- Dr. Anders Jensen Knudby
 Department of Geography, Environment and Geomatics
 University of Ottawa, Ottawa, ON
 Thesis Supervisor, Jan 2019 – Present

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Dr. David Lapen

Ottawa Research and Development Centre, Ottawa, ON

Agriculture and Agri-Food Canada

Supervisor at Agriculture and Agri-Food Canada, January 2020 – Present

613-759-1537

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Dr. Michael Sawada

Ottawa Neighbourhood Study

Department of Geography, Environment and Geomatics

University of Ottawa, Ottawa, ON

Principal Investigator at ONS, Sep 2017 – August 2020

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Dr. Jules M. Blais

Department of Biology

University of Ottawa, Ottawa, ON

Honours Thesis Supervisor, Aug 2018 — Apr 2019

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